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1st Session
HOUSE OF REPRESENTATIVES
REPORT
100-413

SUPERCONDUCTING SUPER COLLIDER AUTHORIZATION ACT OF 1987

OCTOBER 29 (second legislative day), 1987.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

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Mr. ROE, from the Committee on Science, Space, and Technology, submitted the following

REPORT

together with

ADDITIONAL AND DISSENTING VIEWS

[To accompany H.R. 3228]

[Including Congressional Budget Office cost estimate and comparison]

The Committee on Science, Space, and Technology, to whom was referred the bill (H.R. 3228) to authorize appropriations to the Secretary of Energy for the Superconducting Super Collider project, having considered the same, report favorably thereon with an amendment and recommend that the bill, as amended, do pass.

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The amendment is as follows:

Strike all after the enacting clause and insert in lieu thereof the following:

SHORT TITLE

SECTION 101. This Act may be cited as the "Superconducting Super Collider Project Authorization Act of 1987".

PROJECT AUTHORIZATION

SEC. 102. (a) The Secretary of Energy (in this Act referred to as the "Secretary") is hereby authorized to enter into a cooperative arrangement with a State, its departments and agencies, or with universities, nonprofit entities, privately, publicly, or cooperatively owned utilities, industry, or persons, or consortia of such persons for participation in the research and development, design, construction, and operation of a Superconducting Super Collider (in this Act referred to as the "SSC"), in accordance with the "Invitation for Site Proposals for the Superconducting Super Collider (SSC)" (DOE/ER-0315) dated April 1987 and issued by the Department of Energy (to the extent that the invitation is consistent with this Act).

(b) In order to reduce the cost of development, construction, maintenance, and operation of the SSC, the Secretary shall undertake the development of such advanced technologies as may be appropriate and annually review advances in basic and applied research (including superconductivity) that could reduce cost and/or enhance performance of the SSC. The Secretary shall on January of each year prior to the completion of SSC construction submit findings to the Committee on Science, Space and Technology of the House of Representatives and the Committee on Energy and Natural Resources of he Senate on the results of such review.

(c) Within six months of the date of enactment of this Act, the Secretary is authorized and directed to select a project manager for the SSC project. The Secretary shall seek to have the SSC constructed and operating using full and open competition procedures.

(d) In determining the overall ranking of each proposal in the SSC site evaluation process, the relative weighing of the factors to be considered shall be 25 percent for the life cycle costs associated with the site and 75 percent for the technical evaluation criteria (as such costs and criteria are defined by the report of the Under Secretary of Energy dated October 9, 1987, to the Committee on Science, Space, and Technology of the House of Representatives) regarding the suitability of the site. The operating cost credits in such life cycle costs for Department of Energy-owned existing improvements shall not be considered in the evaluation of site proposals. Department of Energy-owned existing site improvements which are considered as construction credits under life cycle costs shall not also be considered under technical evaluation criteria. In any life cycle cost comparison of site proposals, no variance factor shall be employed for purposes of treating life cycle cost estimates as equal.

INTERNATIONAL COST SHARING

SEC. 103. (a) FINDINGS.—The Congress finds that—

(1) as the costs of conducting research in high energy physics have escalated, there has been a growing trend toward international cost-sharing in such research;

(2) scientific research performed at the SSC will be of worldwide benefit and significance;

(3) it is important to the advancement of science and to the United States' relations with foreign countries to promote international scientific cooperation in high-energy physics research;

(4) technologies utilized or developed in the construction of the SSC will be of importance to the United States' economic competitiveness and national security;

(5) there is substantial interest in foreign countries in the construction and use of the SSC;

(6) the Department of Energy, as the agency with primary responsibility for SSC siting and construction, has made preliminary contacts to determine the level of international interest in supporting the proposed SSC; and

(7) there does not currently exist an adequate assessment of the extent of foreign interest and commitment to support funding of the proposed SSC.

(b) ASSESSMENT.—

(1) IN GENERAL.—The Secretary of Energy shall—

(A) ascertain the extent and nature of interest by foreign countries, organizations incorporated in foreign countries, and organizations closely related to foreign countries or foreign organizations in providing funding or other assistance for the construction or operation, or both, of the proposed SSC; and

(B) consult with domestic industries and other Federal agencies to obtain information necessary to carry out subparagraph (A).

(2) CONSULTATIONS.—Beginning February 15, 1988, the Secretary shall carry out consultations with the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate on—

(A) the extent and nature of the assistance which the Secretary determines, on the basis of the assessment carried out under subsection (b)(1), is most likely to be made available for the SSC by the foreign entities described in such subsection;

(B) the potential usefulness of such assistance;

(C) the potential impact of such assistance on the Federal budget for fiscal year 1989 and thereafter;

(D) the national security problems that may arise as a result of technology transfer attendant to foreign countries' participation in the SSC project, and reasonable safeguards that could be implemented to reduce significantly the likelihood of such problems arising;

(E) the manner in which the competitiveness of domestic industries may be affected by the acceptance of foreign offers of participation in the construction and operation of the SSC;

(F) the actions taken in making the assessment described in subsection (b)(1)(A) and the nature and extent of the consultations carried out under subsection (b)(1)(B); and

(G) the extent and nature of the cooperation among Federal agencies that will be necessary to assure meaningful participation by foreign countries and organizations in the SSC project while reducing, to the maximum extent practicable, problems concerning the national security of the United States and unreasonable competition from foreign countries and organizations.

CONFLICT OF INTEREST

SEC. 104. (a) Except as provided in subsection (b), the Secretary shall not enter into any agreement to manage or in any way control or support the operation of the SSC facility with any person providing advice, program direction, oversight, technical analyses or other technical or management assistance to the Department of Energy on the SSC project.

(b) The Secretary may enter into such agreement with such person if the Secretary—

(1) finds and reports in writing to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate 60 days prior to consummating such agreement (not including any day on which either House of Congress is not in session because of adjournment of more than 3 calendar days to a day certain) that such agreement is necessary, in the best interest of the Nation, and cannot reasonably be consummated with other persons who have not provided such advice, program direction, oversight, technical analyses, or other technical or management assistance; and

(2) simultaneously publishes such a finding in the Federal Register.

AUTHORIZATION OF APPROPRIATIONS

SEC. 105. There is authorized to be appropriated—

(1) for fiscal year 1988 to carry out the purposes of this Act for operating expenses, including research and development and site evaluation, $25,000,000; for fiscal year 1989 for operating expenses, including research and development and capital equipment, $86,000,000; and for fiscal year 1990 for operating expenses, including research and development and capital equipment, $90,000,000; and

(2) for Project 88-R-103, site undetermined, for fiscal year 1988 for architectural/engineering and long-lead procurement, $10,000,000; for fiscal year 1989 for construction, $283,000,000; and for fiscal year 1990 for construction, $585,000,000.

FUTURE AUTHORIZATION REQUESTS

SEC. 106. For each fiscal year subsequent to fiscal year 1988 through the end of operation of the SSC, the President shall submit as part of the proposed budget request to Congress a 2 year authorization and appropriation request for the development, construction, and operation of the SSC.

PROPOSAL FOR FUNDING

SEC. 107. The President shall propose funding to develop, construct, and operate the SSC in a manner that supports, and does not in any way diminish, other science and space research activities. The President shall in the annual budget request to Congress treat the SSC funding requirements as an incremental addition to the ongoing Federal support for the civilian science budgets of the Department of Energy, the National Aeronautics and Space Administration, and the National Science Foundation.

BUDGET JUSTIFICATION REPORT

SEC. 108. The Director of the Office of Science and Technology Policy within the Executive Office of the President shall prepare and include within the budget justification documents which accompany the President's proposed budget request to Congress, a financial plan for each fiscal year during the development and construction of the SSC facility, which identifies the funding requirements (i.e., expected requirements for appropriations or new obligational authority and outlays) for the current year and the two succeeding fiscal years to complete the development and construction of all other civilian science facilities, including, but not limited to, the space station, and to provide necessary operating and capital equipment expenses for all civilian science programs within the Federal Government. Such financial plan shall also include an analysis of any differences between the current year financial plan and the prior year financial plan.

DEPARTMENT OF ENERGY REPORT

SEC. 109. Within 30 days of receipt of the report of the National Academy of Sciences/National Academy of Engineering containing the Best Qualified List of sites, the Secretary shall submit the report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate.

CONGRESSIONAL BUDGET OFFICE REVIEW

SEC. 110. (a) Within 60 days of enactment of this Act, the Congressional Budget Office shall review the cost estimate published by the Department of Energy's Central Design Group in March 1986, in a document entitled "The Conceptual Design of the Superconducting Super Collider" (SSC-SR-2020) and submit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate on the adequacy and accuracy of such cost estimate.

(b) Within 60 days of completion of a site-specific design by the Department subsequent to site selection, the Congressional Budget Office shall review the associated cost estimates for such site specific design and submit a report to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resoures of the Senate on the adequacy and accuracy of such cost estimate.

I. SUMMARY OF COMMITTEE ACTIONS

The Committee on Science, Space, and Technology on October 15, 1987, met in open session and adopted an amendment in the nature of a substitute to H.R. 3228, a bill to authorize appropriations to the Secretary of Energy for the Superconducting Super Collider Program, as introduced, by a recorded vote of 38 "ayes" to 6 "nays."

H.R. 3228 was introduced by Chairman Roe and Mr. Lujan, the Ranking Republican Member, along with 230 original cosponsors, on August 7, 1987. The bill was referred solely to the Committee on Science, Space, and Technology. The Subcommittee on Energy Re-

search and Development (the lead Subcommittee of jurisdiction) was referred H.R. 3228 on September 21, 1987. It was subsequently discharged from further consideration of the bill during Committee consideration on October 15th.

The Committee began its oversight of the Superconducting Super Collider concept in 1983. The details of the Committee's involvement and the evolution of the project appear in the background section of this report.

Prior to introduction of H.R. 3228, hearings were held and testimony received on the Superconducting Super Collider program on April 7, 8, 9, 1987 and on May 7, 1987. The witnesses represented States, localities and other representatives from States interested in submitting site proposals to the Department of Energy (DOE); U.S. and international R&D interests; concerned science and university groups; and all affected Federal agencies.

On October 15, 1987, at the time of Committee consideration, there were 267 cosponsors for H.R. 3228.

II. PURPOSE OF THE BILL

The purpose of H.R. 3228 is to authorize the research and development, design, construction, and operation of a 20-trillion electron volt (TeV) proton accelerator facility called the Superconducting Super Collider (SSC). The SSC will provide for two beams of protons to collide after traveling through an underground circular tunnel approximately 52 miles in circumference. As presently conceived, the beams themselves will have diameters of only a few millimeters passing through the bore or inside diameter of magnets and pipe of roughly 4 centimeters in diameter. The beams will travel through the ring under high vacuum. They will be focused and guided by powerful magnets operating at the ultra-low temperature of liquid helium.

The two well-collimated 20-TeV beams of protons will travel through the tunnel in opposite directions at nearly the speed of light. When proton-proton collisions are produced, the relative energy of the beams will be 40 TeV, allowing for studies in a new regime of high energy physics. The collisions will be affected at several selected points around the ring in underground experimental halls. Sophisticated electronic detectors will record the bits and pieces of "nuclear debris" that result from these collisions. In this way, scientists will further determine the elemental composition of matter and the forces between the basic units at the new level of perception afforded by this higher energy region.

III. BACKGROUND AND NEED FOR THE LEGISLATION

The following dates provide a chronology of events leading up to this recommendation by the Committee:

A SUPERCONDUCTING SUPER COLLIDER CHRONOLOGY

June 28 to July 16, 1982.... The SSC concept originated in a Snowmass (Colorado) Summer Study sponsored by the Division of Particles and Fields of the American Physical Society. About 150 participants (approximately two-thirds from universities and one-third from the DOE national laboratories) met to assess the future of high energy physics, to explore the limits of current technological capabilities, and to consider the nature of future major facilities for high energy physics in the United States. A widespread recognition of the need, and importance of, a multi-TeV proton-proton collider arose from this Summer Study.

February 1983..... At the request of Dr. Alvin W. Trivelpiece, Director of DOE's Office of Energy Research, the DOE High Energy Physics Advisory Panel [HEPAP] formed a Subpanel on New Facilities to consider, and make recommendations relative to, the scientific requirements and opportunities for a forefront U.S. high energy physics program in the next 5 to 10 years.

Feb. 28 to Mar. 4, 1983.... The Division of Particles and Fields of the American Physical Society sponsored a Workshop on Hadron Collider Detectors: Present Capabilities and Future Possibilities at Lawrence Berkeley Laboratory. Approximately 100 experimenters, predominantly from the U.S., attended the workshop and addressed the issues of detector technologies in the face of multiplicities and secondary energies expected from machines like the SSC. The general conclusion was that, while difficult, the required experiments would be possible.

Mar. 28 to Apr. 2, 1983.... Building on the Snowmass findings, 40 U.S. and European experts in accelerator science and accelerator and construction technology participated in a 20-TeV Hadron Collider Technical Workshop at Cornell University to consider further the technical issues associated with the SSC. A finding of this workshop was that there appeared to be no fundamental accelerator physics problems to prevent successful operation of such a collider.

July 12, 1983..... HEPAP endorsed and transmitted to DOE the report of the HEPAP Subpanel on New Facilities entitled "Report of the 1983 HEPAP Subpanel on New Facilities for the U.S. High Energy Physics Program" (DOE/ER-0169). HEPAP's first and unanimous recommendation was to begin immediately a project to design and construct a multi-TeV, high-luminosity proton-proton collider designated as the SSC. HEPAP also recommended that the Isabelle project at Brookhaven National Laboratory be terminated, and that the Colliding Beam Accelerator Project at Brookhaven National Laboratory (the proposed follow-on project to Isabelle) not be approved.

August 1983..... Dr. Alvin W. Trivelpiece, Director of DOE's Office of Energy Research, requested that a HEPAP subpanel be established to provide advice and recommendations on the content and implementation of a Fiscal Year 1984 R&D effort preliminary to the initiation of a formal SSC R&D program. Prof. W.K.H. Panofsky, Director of Stanford Linear Accelerator Center, chaired the subpanel. In several meetings held during the fall of 1983, the subpanel reviewed the various requests to carry out the relevant R&D and recommended that several different approaches to SSC magnet R&D be pursued. This and other recommendations were endorsed by HEPAP and transmitted to the DOE.

Oct. 18, 1983..... Secretary of Energy Hodel, in a letter to the Hon. Don Fuqua, Chairman of the House Committee on Science and Technology, notified the Committee of his decision to terminate the Isabelle project at Brookhaven National Laboratory, to not approve the Colliding Beam Accelerator project (the proposed follow-on project to Isabelle) at Brookhaven, and to initiate R&D for a "future high energy physics facility" with reprogrammed funds.

Oct. 19, 1983..... House Science and Technology Committee's Subcommittee on Energy Development and Applications held a hearing on "High Energy Physics Facilities" addressing the issues raised by the July, 1983, HEPAP report and the October 18, 1983, letter of Secretary Hodel. Department of Energy officials and HEPAP members testified.

Oct. 19, 1983..... DOE issued a News Release on initial steps for the SSC.

Nov. 7, 1983..... Elizabeth E. Smedley, DOE's Acting Assistant Controller, in a letter to the Hon. Don Fuqua, Chairman of the House Committee on Science and Technology, provided details of DOE's plans to reprogram those funds identified in Secretary Hodel's letter of October 18. DOE proposed to use $18 million "toward advanced accelerator research and development for a future high energy physics facility."

Dec. 14, 1983..... Directors of the U.S. high energy physics laboratories chartered the National SSC Reference Designs Study to review in detail the technical and economic feasibility of a range of technical options for creating the SSC facility. The study, which was centered at Lawrence Berkeley Laboratory from February through May, 1984, involved some 150 scientists and engineers from several national laboratories and universities. Organized into 6 task groups, these technical experts worked under the direction of Professor Maury Tigner of Cornell University.

Dec. 12-17, 1983..... The American Physical Society's Division of Particles and Fields held a Workshop on Accelerator Issues for the SSC at the University of Michigan, Ann Arbor. About 70 accelerator specialists from many laboratories and universities identified crucial accelerator physics issues that must be addressed to demonstrate the feasibility of the SSC, and identified key R&D needs.

Dec. 19, 1983..... DOE received final Congressional approval for DOE to reprogram $18 million in Fiscal Year 1984 funds for research and development activities preliminary to the SSC.

A SUPERCONDUCTING SUPER COLLIDER CHRONOLOGY—Continued

Jan. 17–19, 1984 ..... The American Physical Society's Division of Particles and Fields held a Cryogenic Workshop at Brookhaven National Laboratory. Approximately 100 experts in cryogenic systems, superconducting magnet design and fabrication, and accelerator physics, attended this workshop, and addressed the cryogenic issues most pertinent to the design of a large-scale accelerator using superconducting magnets.

Feb. 22, 1984 ..... Subsequent to DOE's Fiscal Year 1985 budget request of $20 million for preliminary R&D studies for the SSC, the House Science and Technology Committee's Subcommittee on Energy Development and Applications received Testimony from Dr. Alvin W. Trivelpiece, Director of DOE's Office of Energy Research, and Dr. Maury Tigner, Director of Operations, Wilson Synchrotron Laboratory, Cornell University and Director of the National SSC Reference Designs Study, on SSC R&D program plans for Fiscal Year 1984 and Fiscal Year 1985.

Mar. 1, 1984 ..... DOE assigned Universities Research Association (URA) responsibility to provide interim management assistance to the Department for the national effort during the R&D and conceptual design phase of the SSC. URA set up a Board of Overseers (BOO) chaired by Professor Boyce McDaniel of Cornell University. (The first BOO meeting was held March 23, 1984.) Professor Maury Tigner of Cornell University was selected as Director of the Central Design Group (June 22, 1984). Lawrence Berkeley Laboratory was chosen as the host institution for the CDG (September 10, 1984).

May 8, 1984 ..... National SSC Reference Designs Study Group issued its findings in a report entitled "Superconducting Super Collider Reference Designs Study" for the U.S. Department of Energy which established the technical feasibility, economic credibility, and specific R&D needs of the envisioned SSC project. The Reference Designs Study (RDS) examined SSC designs for 3 magnet types, provided detailed estimates based on identified credible assumptions about probable R&D accomplishments, and identified R&D needs. The RDS cost estimate was about $3 billion for construction (in Fiscal Year 1984 dollars). Not included in these estimates were costs for the continuing R&D program on accelerator components, for site acquisition, for the preoperational commissioning of the facility, for procurement of central computers, and for fabrication of an initial complement of detectors for the SSC research program.

May 18, 1984 ..... A DOE Review Committee, acting on the result of a review of the RDS from May 8–11, 1984, endorsed the Study, and issued a report entitled "Report of the DOE Review Committee on the Reference Designs Study for the Superconducting Super Collider."

June 23 to July 13, 1984 ... The Division of Particles and Fields of the American Physical Society sponsored a Snowmass Summer Study on the Design and Utilization of the SSC. Over 250 participants examined the RDS and SSC utilization for physics experiments. This Summer Study reaffirmed the primary SSC parameters of the RDS as important for meeting the physics goals of high energy physics.

Aug. 16, 1984 ..... Secretary of Energy Hodel concurred with a plan to initiate Fiscal Year 1985 SSC "Phase I" (i.e., preconstruction) research and development activities.

Oct. 1, 1984 ..... Central Design Group began operation.

Nov. 30, 1984 ..... Dr. Alvin W. Trivelpiece, Director of DOE's Office of Energy Research, sent letters to the Presidents of URA, the National Academy of Sciences and the National Academy of Engineering establishing a site selection procedure for the proposed SSC.

Dec. 14, 1984 ..... DOE issued a News Release announcing the planned SSC site selection procedure.

Feb. 28, 1985 ..... Subsequent to DOE's Fiscal Year 1986 budget request of $20 million for SSC PHASE I R&D, the House Science and Technolgy Committee's Subcommittee on Energy Development and Applications received Testimony from Dr. Alvin W. Trivelpiece, Director of DOE's Office of Energy Research, and Dr. Maury Tigner, Director, SSC Central Design Group, on SSC R&D program plans for Fiscal Year 1985 and Fiscal Year 1986.

Apr. 25, 1985 ..... House Science and Technology Committee's Science Policy Task Force received Testimony from the Department of Energy, DOE and NSF high energy physics laboratory directors, as well as representatives from CERN in Europe, DESY in the Federal Republic of Germany, KEK in Japan, and the European Committee for Future Accelerators on the potential for future collaboration in high energy physics and high energy physics facilities, including the SSC.

May 15, 1985 ..... Dr. Alvin W. Trivelpiece, Director of DOE's Office of Energy Research, requested that HEPAP review the state-of-the-art approaches to accelerating particles to high energies in the manner required for elementary particle physics research, and to explore the various alternate means to obtain improved acceleration gradients or other accelerator technology improvements which could substantially lower costs below those projected for the SSC. The HEPAP Subpanel on Advanced Accelerator R&D and the SSC was organized in August 1985, and was chaired by Professor Robert Siemann of Cornell University.

May 20–21, 1985 ..... The First SSC Users Meeting was held at the University of California, Berkeley campus. There were 135 attendees from 57 different institutions.

A SUPERCONDUCTING SUPER COLLIDER CHRONOLOGY—Continued

June 15, 1985 ..... The Central Design Group issued the SSC Siting Parameters Document, entitled "Superconducting Super Collider Siting Parameters Document: A Technical Advisory on SSC Site Criteria and Catalog of Site Information Needs." This technical advisory to the DOE summarized important siting criteria for the SSC and enumerated site-specific information important to the evaluation of potential sites.

June 18, 1985 ..... House Science and Technology Committee's Science Policy Task Force received Testimony from Dr. Victor Weisskopf, Professor of Physics, Massachusetts Institute of Technology, on international cooperation in high energy physics, including the potential for such cooperation on the SSC.

Sept. 9, 1985 ..... SSC Magnet Selection Advisory Panel reported to the Director of the Central Design Group that, as a result of its review of SSC Dipole magnet types on Aug. 25–28, 1985, it recommended the high-field cosine theta magnet design as the design basis for the SSC dipole element.

Oct. 15, 1985 ..... HEPAP transmitted to DOE its report entitled "Report of the 1985 High Energy Physics Advisory Panel Study of the U.S. High Energy Physics Program 1985–1995" (DOE/ER–0233). This study was an in-depth review of the U.S. high energy physics program, focussing on the next 10 years. HEPAP concluded that the physics justification for the SSC was even stronger than it was in July, 1983, at the time of the original HEPAP recommendation.

Oct. 19, 1985 ..... House Science and Technology Committee's Subcommittee on Energy Development and Applications held a hearing on "Status and Plans of the United States and CERN High Energy Physics Programs and the Superconducting Super Collider [SSC]". The Subcommittee received Testimony from Department of Energy and CERN officials. In addition, members of the Central Design Group, the Texas Accelerator Center and the SSC Magnet Advisory Panel testified on the choice of the SSC magnet type.

Dec. 20, 1985 ..... HEPAP transmitted to DOE its report entitled "Report of the HEPAP Subpanel on Advanced Accelerator R&D and the SSC" (DOE/ER–0255). HEPAP agreed "fully that although advanced accelerator research is essential for the long-term progress of high energy physics, 'the state of development of this research is such that it does not offer an alternative to present SSC plans.'"

Mar. 5, 1986 ..... House Science and Technology Committee's Subcommittee on Energy Development and Applications received Testimony from Dr. Alvin W. Trivelpiece, Director of DOE's Office of Energy Research, on SSC R&D program plans for Fiscal Year 1986 and Fiscal Year 1987. No specific SSC R&D funds were identified in DOE's Fiscal Year 1987 budget request.

Mar. 31, 1986 ..... The Central Design Group issued the report "Conceptual Design of the Superconducting Super Collider" (SSC–SR–2020), a 712-page document, with over 2,000 pages of supporting attachments, comprising plans and cost estimates for all components of the SSC facility. The Conceptual Design Report (CDR) documented the estimated cost for constructing an SSC facility at approximately $3.01 billion in Fiscal Year 1986 dollars, which included $529 million in contingency. Not included in this estimate were costs for further R&D on accelerator components for site acquisition, for the preoperational commissioning of the facility, for procurement of central computers, and for fabrication of detectors for the SSC research program.

Apr. 17, 1986 ..... Dr. Alvin W. Trivelpiece, Director of DOE's Office of Energy Research, charged HEPAP to evaluate the claim of the Texas Accelerator Center that their superferric magnet R&D program had had such success that the superferric magnet design was clearly superior to the high-field cosine theta magnet design selected by the Central Design Group as the SSC magnet of choice.

May 1986 ..... A DOE Review Committee, acting on the result of a review of the CDR from April 28 to May 3, 1986, issued a report entitled "Report of the DOE Review Committee on the Conceptual Design of the Superconducting Super Collider" (DOE/ER–0267). The Committee concluded that the SSC design set forth in the CDR was technically feasible and properly scoped to meet the requirements of the U.S. high energy physics program to well into the next century.

May 20, 1986 ..... HEPAP transmittted to DOE the report entitled "Report of the HEPAP Subpanel on Review of Recent Information on Superferric Magnets" (DOE/ER–0272). HEPAP endorsed the earlier decision of the Central Design Group to choose the high-field cosine theta magnet design over the superferric magnet design.

June 23 to July 11, 1986 ... The Division of Particles and Fields of the American Physical Society sponsored a Snowmass Summer Study on the Physics of the SSC attended by over 250 physicists from 61 organizations and 25 foreign institutions.

Dec. 8, 1986 ..... Dr. Alvin W. Trivelpiece, Director of DOE's Office of Energy Research, in a letter to the Hon. Don Fuqua, Chairman of the House Committee on Science and Technology, notified the Committee of DOE's plan for Fiscal Year 1987 R&D activities related to the SSC. DOE proposed a funding level of $16 million.

Jan. 30, 1987 ..... Secretary of Energy Herrington announced that President Reagan had approved construction of the SSC.

Feb. 5, 1987 ..... DOE submitted a revised budget request for its High Energy Physics program for Fiscal Year 1988 which included $25 million in operating expenses for research and development activities, $10 million for construction activities, and a request for a construction project number 88–R–103.

A SUPERCONDUCTING SUPER COLLIDER CHRONOLOGY—Continued

Feb. 10, 1987	Secretary of Energy Herrington announced the process to be used in the selection of a site for the SSC.
Mar. 23, 1987	A Federal Register notice advised that the DOE intended to solicit proposals from States and others to provide offers of land and other contributions for siting the SSC.
Mar. 25, 1987	House Science Subcommittee on Energy Research and Development made recommendations for the fiscal year 1988 DOE High Energy Physics budget that assumed that up to $35 million would be made available for the SSC of which $20 million would be added later by the full Science Committee.
Apr. 1, 1987	The DOE issued its "Invitation for Site Proposals for the Superconducting Super Collider (SSC)" (DOE/ER–0315).
Apr. 7, 8, 9, 1987	House Committee on Science, Space, and Technology held hearings on the SSC. Officials from the Department of Energy, academia, foreign institutions, and States and Members of Congress testified.
Apr. 29, 1987	DOE held an SSC Site Selection Preproposal Conference.
May 4, 1987	DOE issued an advance Notice of Intent to prepare an environmental impact statement on the siting, construction, operation and decommissioning of the SSC.
May 7, 1987	House Committee on Science, Space, and Technology's Subcommittee on International Scientific Cooperation held a hearing to review the international aspects of the SSC. DOE officials testified.
June 18, 1987	The National Academy of Sciences and National Academy of Engineering announced the appointment of a committee of experts to evaluate the suitability of proposed locations for the SSC. The committee includes experts in high energy physics, engineering geology, accelerator design, economics, procurement, the environment, construction, and large-facility management. Dr. Edward A. Frieman, Director of the Scripps Institution of Oceanography, La Jolla, CA, will serve as committee chairman.
Aug. 7, 1987	Chairman Roe and Mr. Lujan, the Ranking Republican Member, along with 230 original cosponsors, introduced H.R. 3228.
Sept. 2, 1987	Final date for receipt by DOE of SSC site proposals. DOE received 43 proposals for sites in 25 States by the 2:00 p.m. deadline.
Sept. 18, 1987	DOE forwarded 36 proposals to the National Academy of Sciences/National Academy of Engineering for their evaluation. These proposals, for sites in 25 States, met all of DOE's basic qualification criteria.
Oct. 15, 1987	The Committee on Science, Space, and Technology met in open session with a quorum present, and adopted an amendment in the nature of a substitute, with an amendment, to H.R. 3228, a bill to authorize appropriations to the Secretary of Energy for the Superconducting Super Collider Program, as introduced, by a recorded vote of 38 "ayes" to 6 "nays."

SSC R&D was funded within the DOE High Energy Physics budget at about $20 million per year from Fiscal Year 1984 through Fiscal Year 1986. Prior to the President's approval of the Super Collider, the R&D program for Fiscal Year 1987 was $16 million, which was later increased to $20 million.

DOE submitted a budget request for $35 million on February 5, 1987, for the SSC in an amendment to the Fiscal Year 1988 budget request for High Energy Physics. The Subcommittee on Energy Research and Development made recommendations for the High Energy Physics budget on March 25 and assumed that up to $35 million would be made available for the SSC project of which $20M would be added later by the full Committee. The Committee held hearings on the SSC on April 7, 8, and 9 and on May 7 with witnesses from the DOE, the scientific community and industry as well as Governors and Congressmen from interested states. H.R. 3228 was introduced on August 7, 1987.

The Superconducting Super Collider will be the world's premier high energy particle accelerator. It will boost protons to energies 20 times higher than ever before, enabling physicists to search out the elementary constituents of matter and evidence of fundamental forces at unprecedented interaction distances of just one-thou-

sandth the diameter of a proton which is just ten thousandths of a billionth of a centimeter.

The century's great advances in accelerator technology have allowed fundamental science to make tremendous strides in both nuclear and high energy physics. Each new machine has revealed new particles and/or different forces which have deepened our understanding of the universe. The SSC is a necessary prerequisite to continuing this nation's search for nature's deepest secrets and the ultimate description of the relationships among the most fundamental forces. It is an indispensable tool for progress in high energy physics and a valuable adjunct to aid our understanding of the universe.

New insights in particle physics from the SSC, combined with contemporary ideas in condensed matter theory, should also provide an enhanced portrayal of cosmological evolution in the very early instance of the universe and the fundamental relationship between matter and energy at that time.

For the past 50 years, the United States has been undeniably preeminent in the world in the discipline of high energy physics. The unrivaled research opportunities at our major accelerator laboratories attracted foreign scientists in large numbers, particularly after World War II. But in the last decade, there has been a shift. More and more American physicists are traveling overseas to take part in experiments at high energy physics facilities, particularly those at the European Center for Nuclear Research (CERN) near Geneva, Switzerland. These new accelerators, such as the High Energy Research Accelerator (HERA) facility at the Deutsches Electronen Synchrotron (DESY) Laboratory in the Federal Republic of Germany and the soon-to-be completed Large Electron Positron (LEP) facility at CERN near Geneva, Switzerland and their supporting laboratories have been built with a growing awareness of their significance with regard to international prestige. They are not only major research institutions, but also centers of higher education and physics, sources of technological innovation, and symbols of national and multinational commitment to the growth of human knowledge.

The SSC, as the next step in high energy physics research facilities, should attract the best particle physicists from around the world, fostering a new level of international cooperation. It will also prove a great attraction to this nation's best young minds as they look toward particle physics for an intellectual challenge. It will be undeniable evidence that the United States remains committed to progress and economic growth through advances in science and education.

The accelerator technology developed for high energy and nuclear physics has found many uanticipated beneficial uses. The typical modern x-ray machine is a much refined version of the early laboratory vacum tubes; more powerful x-ray machines are small linear accelertors. As an unanticipated bonus, particle beams are also used for treating certain kinds of inoperable tumors.

One of the most widespread benefits from particle physics' technology is that of the synchrotron radiation emitted by certain particle accelerators which is finding many scientific and technological applications. These devices (e.g., the Alternating Gradient Synchro-

ton (AGS) at Brookhaven National Laboratory) were designed to achieve high energy particle collisions and the emitted radiation was first considered as an annoying side effect. Today, these radiation sources provide unique tools for the study of complex surface catalysis mechanisms, ultrafast petrochemical reactions, medical diagnostic techniques, as well as allowing for biological microholography of living specimens, and x-ray lithography of micro-electronic circuits. These applications are being vigorously pursued at our national laboratories and many other accelerator facilities in the United States and abroad. Although it is clear that the very challenging areas of detector hardware and software and particle beam controls will have obvious technological implications, there is no way of forecasting the long-term benefits of the SSC except to know they are expected to be at least as significant as for past developments in particle physics.

Thus, construction of the SSC by the United States will assure national pre-eminence in high energy physics and a number of yet-to-be-identified technological benefits.

IV. EXPLANATION OF COMMITTEE AMENDMENTS

The Committee on Science, Space, and Technological adopted an amendment in the nature of a substitute to H.R. 3228, as introduced.

Section 101. Short title

Section 101 titles the act the "Superconducting Super Collider Project Authorization Act of 1987".

Section 102. Project authorization

Section 102(a) authorizes the Secretary of Energy to enter into agreements with any of the 50 states of the United States or any other party for participation in the program to build and operate the Superconducting Super Collider facility. The agreements are required to be, and the authorization is, in accordance with the Department of Energy's "Invitation for Site Proposals for the Superconducting Super Collider (SSC)" (DOE/ER-0315) dated April, 1987.

Nothing in the bill is intended to restrict DOE's authority to explore innovative contractual relationships which could reduce the impact of the SSC on the Federal budget in both the construction and operating phases of the Project.

Subsection 102(b) directs the Secretary of Energy to conduct appropriate development work on advanced technologies that could reduce the cost or enhance the performance of the SSC. Additionally, the Secretary is also directed to annually review advances in research (e.g., the implications of the recent breakthroughs in high temperature superconductivity) that could improve the performance of the SSC. In January of each year during construction, the Secretary is required to report to the appropriate committees of Congress on the results of its review.

Subsection 102(c) requires the Secretary to select a project manager for the SSC project within six months of passage. Furthermore, because the President made the decision to proceed with the project on January 30, 1987, selection of such project manager

could easily be done within 6 months of passage of this Act. The Secretary is also directed to select the project manager using full and open competition to select the project manager using full and open competition procedures as required by existing law.

Subsection 102(d) directs the Secretary, in determining the overall ranking of each site proposal, to give 75% of the weight to Technical Evaluation Criteria, i.e. the technical suitability of the sites, and the remaining 25% of the weight to Life Cycle Costs (LCC), i.e. the costs of constructing and operating the SSC over a 25-year period. The Committee took this important step in order to provide more certainty in the selection process to all those proposing sites for the SSC. The DOE has indicated that Technical Evaluation Criteria are of primary consideration while LCC are secondary, but in the Committee's view this does not provide sufficient certainty given the critical importance of the overall site selection process. The terms "Technical Evaluation Criteria" and "Life Cycle Costs" are given the meanings ascribed to those terms in the October 9, 1987, report to the Committee on Science, Space, and Technology from the Under Secretary of Energy. This report is reprinted in its entirety below.

Department of Energy
Washington, DC 20585

October 9, 1987

Dear Mr. Chairman:

I was pleased to be able to meet with you on October 6, 1987, to discuss the Superconducting Super Collider (SSC). The Administration is enthusiastic about the potential for this promising science initiative. Your interest and support for the SSC is very important and is appreciated.

During our discussions, I made a commitment to provide additional information to you about the SSC site selection process. I have enclosed information which outlines the SSC site selection process and schedule, technical evaluation criteria, life cycle cost considerations, the membership of DOE's SSC Site Task Force and the Supercollider Site Evaluation Committee formed by the National Academy of Sciences/National Academy of Engineering, and supporting contractor resources.

I hope that this information adequately outlines the SSC site selection process. I am always available to provide any additional information you may require.

Yours truly,

Joseph F. Salgado
Under Secretary

Honorable Robert A. Roe
Chairman
Committee on Science, Space,
and Technology
House of Representatives
Washington, DC 20515

6 Enclosures

Enclosure 1

THE SUPERCONDUCTING SUPER COLLIDER (SSC) SITE SELECTION PROCESS

The selection process for a site on which to build the Superconducting Super Collider (SSC) will be a fair and open competitive process comprised of seven major steps described below.

1. DOE Issues the Invitation for Site Proposals — April 1, 1987

   The Invitation for Site Proposals for the SSC (Invitation) was issued April 1, 1987. It contains a description of the SSC and its siting requirements, real estate ownership requirements, procedures for selection, qualification criteria which had to be met in order for a proposal to be considered further, technical evaluation criteria and cost considerations (including their relative importance) and a list of the information requested of proposers.

2. DOE Receives and Screens Proposals — September 2-17, 1987

   A total of 43 SSC site proposals were received by the Department of Energy (DOE) by the 2:00 p.m. deadline on September 2, 1987. These proposals were analyzed by the DOE SSC Site Task Force (STF) against the qualification criteria, and their findings were presented to the DOE Energy System Acquisition Advisory Board (ESAAB) on September 17, 1987. The ESAAB approved 36 proposals as qualified for further consideration.

3. DOE Refers Qualified Proposals to NAS/NAE for Evaluation — September 17, 1987

   On September 17, 1987, the DOE forwarded a listing of the 36 qualified SSC site proposals to the National Academy of Sciences/National Academy of Engineering (NAS/NAE). The NAS/NAE has formed a Supercollider Site Evaluation Committee (SSEC) to evaluate these proposals. This is a select group of distinguished individuals appointed by the Presidents of the Academies. The SSEC is currently reviewing these qualified proposals to determine their overall excellence in meeting the needs of the Nation for an outstanding science facility. Their evaluation of proposals is being conducted against the technical evaluation criteria and cost considerations set forth in the SSC Invitation for Site Proposals.

4. NAS/NAE to Recommend Best Qualified Sites — January 1988

   The Academies will provide to DOE their evaluation and recommendation of the most excellent proposals - a Best Qualified List (BQL). The number of proposals that will be in the final unranked group provided to DOE cannot be foreseen at this time. Once received, the STF will review the Academies' evaluation of all qualified sites to confirm that it was

conducted against the technical evaluation criteria and cost considerations set forth in the Invitation. The STF will present its findings to the ESAAB who will make the determination of the BQL.

5. DOE to Designate Preferred Site — July 1988

Following the DOE determination of the most excellent sites, additional geological and environmental information will be requested of finalists and confirmatory investigations will be conducted by DOE. The SSC Site Task Force will analyze this information and present its findings to the ESAAB. Based on the Academies' evaluation, this additional information and the ESAAB findings, the Secretary will designate the preferred site.

6. Safety and Environmental Review Process

An Environmental Impact Statement (EIS) will be prepared for the SSC in accordance with the National Environmental Policy Act (NEPA) process. This process was initiated after the issuance of the SSC Invitation for Site Proposals. It includes comment on the proposed scope of the EIS, preparation of a Draft EIS with opportunity for public comment, preparation of a Final EIS, and issuance of a Record of Decision. Site specific activities will not commence until the designation of the BQL. The BQL will constitute the reasonable alternatives for the preparation of the EIS.

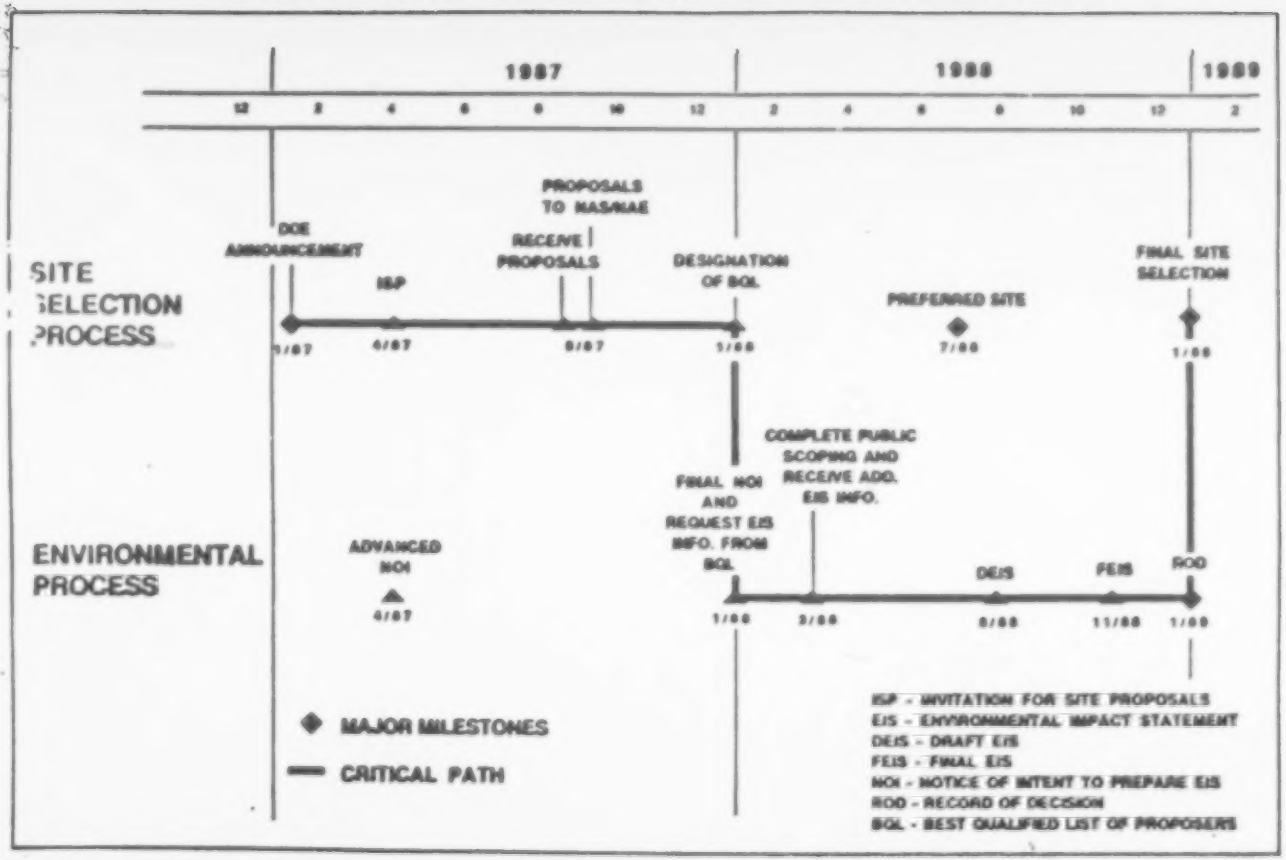
Environmental impacts of constructing and operating the SSC, including those relating to public health and safety (particularly radiation safety) will be addressed in the EIS. The issuance of the Record of Decision based on the final EIS is the last step of the site selection process.

7. Final Site Selection and Site Preparation — January 1989

The Secretary of Energy will announce the final site selection following completion of the NEPA process. Preliminary and Final Safety Analyses will be prepared during the design and construction phases of the project.

SSC SITE SELECTION SCHEDULE

10/08/87



Enclosure 2

SSC SITE SELECTION
TECHNICAL EVALUATION CRITERIA

Information provided in the proposals will be evaluated against the following technical evaluation criteria in determining the BQL and in identifying the preferred site. The criteria are listed in descending order of relative importance.

1. GEOLOGY AND TUNNELING

   a. Suitability of the topography, geology, and associated geohydrology for efficient and timely construction of the proposed SSC underground structures.

   b. Stability of the proposed geology against settlement and seismicity and other features that could adversely affect SSC operations.

   c. Installation and operational efficiency resulting from minimal depths for the accelerator complex and experimental halls.

   d. Risk of encountering major problems during construction.

2. REGIONAL RESOURCES

   a. Proximity of communities within commuting distance of the proposed SSC facilities capable of supporting the SSC staff, their families and visitors. Adequacy of community resources--e.g., housing, medical services, community services, educational and research activities, employment opportunities for family members, recreation, and cultural resources--all available on a non-discriminatory basis.

   b. Accessibility to the site, e.g., major airport(s), railroads, and highway system serving the vicinity and site.

   c. Availability of a regional industrial base and skilled labor pool to support construction and operation of the facility.

   d. Extent and type of state, regional, and local administrative and institutional support that will be provided, e.g., assistance in obtaining permits and unifying codes and standards.

3. ENVIRONMENT

   a. Significance of environmental impacts from siting, constructing, operating, and decommissioning the SSC.

b. Projected ability to comply with all applicable, relevant, and appropriate Federal, state, and local environmental/safety requirements within reasonable bounds of time, cost, and litigation risk.

c. Ability of the proposer, the DOE, or both to reasonably mitigate adverse environmental impacts to minimal levels.

4. SETTING

a. Ability of the proposer to deliver defendable title, in accordance with the schedule in Section 2.2.2.4, for land and estates in land that will adequately protect the Government's interest and the integrity of the SSC during construction and operation.

b. Flexibility to adjust the position of the SSC in the nearby vicinity of the proposed location.

c. Presence of natural and man-made features of the region that could adversely affect the siting, construction, and operation of the SSC.

5. REGIONAL CONDITIONS

a. Presence of man-made disturbances, such as vibration and noise, that could adversely impact construction and operation of the SSC.

b. Presence of climatic conditions that could adversely impact construction and operation of the SSC.

6. UTILITIES

a. Reliability and stability of the electric power generating and transmission grid systems. Flexibility for future expansion.

b. Reliability, quality, and quantity of water to meet the needs of the facility.

c. Availability of fuel, waste disposal, and sewage disposal.

Enclosure 3

SSC LIFE CYCLE COST (LCC) ANALYSIS

1. The Invitation for Site Proposals, issued by the Department of Energy on April 1, 1987, notes that primary emphasis will be placed on the results from the evaluation of the technical evaluation criteria; however, cost considerations will play a significant role.

2. A complete LCC for the construction and a 25-year operating period will be prepared by RTK, a DOE contractor, for each site proposal and given to the National Academy of Sciences/National Academy of Engineering (NAS/NAE) for their consideration in the development of the Best Qualified List (BQL). Both the NAS/NAE and DOE will consider the LCC in their evaluation of proposed sites.

3. The purpose of the LCC effort is to provide a mechanism to enable the DOE to make a comparative analysis of the cost consequences of locating the SSC at different proposed sites. The basis of this analysis is the SSC Conceptual Design Report (CDR).

4. The CDR provides the details of the total construction costs for the project based on national average rates for labor and materials. In parallel with this work, estimates have been formulated for the operating funds and equipment needs over 25 years following the last year of construction.

5. The major cost categories considered in the LCC are:

   a. Construction
   b. Pre-operating
   c. Operating
   d. Accelerator R&D
   e. Accelerator R&D Equipment
   f. Accelerator Operations Equipment
   g. Experimental Operations Equipment
   h. Accelerator Improvement Projects
   i. General Plant Projects/General Purpose Equipment
   j. Detectors

6. The most variable portions of the LCCs are expected to be underground construction costs and local costs of labor and power.

7. Comparisons of estimates in the SSC Conceptual Design Report with those prepared using the LCC model indicate a variance of about 3% for the LCC estimates.

8. Therefore, the LCC estimates will be subject to a paired comparison in that any two sites whose LCCs differ by less than 3% will be treated as equal for cost evaluation purposes.

9. DOE will make the comparisons and provide the results to the NAS/NAE along with each proposal's LCC estimate and related backup material.

Enclosure 4

September 1, 1987

SSC SITE TASK FORCE MEMBERS

Wilmot N. Hess, Chairman
SSC Site Task Force
Office of Energy Research

L. Edward Temple, Jr.
Executive Director
SSC Site Task Force
Office of Energy Research

Richard H. Nolan
San Francisco Operations Office *

Daniel R. Lehman
Office of Energy Research

Robert Strickler
Office of Assistant Secretary
for Environment, Safety, and Health

Robert Forst
Office of General Counsel *

Donald G. Trost
Office of Assistant Secretary
Management and Administration

Gary McKinney
Office of Assistant Secretary
Management and Administration

Robert A. Zich
Office of Energy Research

Earle C. Fowler
Office of Energy Research

* Non-voting member

Enclosure 5

NATIONAL ACADEMY OF SCIENCES

NATIONAL ACADEMY OF ENGINEERING

Supercollider Site Evaluation Committee

CHAIRMAN

Edward Frieman
Director
Scripps Institution of Oceanography

MEMBERS

Robert McCormick Adams
Secretary
Smithsonian Institution

William Baumol
Department of Economics
New York University

John Cantlon
Vice President
Michigan State University

Lloyd Cluff
Manager, Geosciences Department
Pacific Gas and Electric Company

Ernest Courant
Senior Physicist
Brookhaven National Laboratory

Don Deere
Private Consultant

Thomas Everhart
President
California Institute of Technology

Marvin Goldberger
Director
Institute for Advanced Study

William Gould
Chairman Emeritus
Southern California Edison Company

LTG Elvin Heiberg, III
Chief of Engineers
Department of the Army

Edward Jefferson
E.I. du Pont de Nemours & Co.

Herman Leonard
John F. Kennedy School of Government
Harvard University

Walter Massey
Vice President for Research and Argonne National Laboratory
University of Chicago

Paul Reardon
Vice President, and Director of Experimental Projects
Science Applications International Corporation

Nicholas Samios
Director
Brookhaven National Laboratory

Roy Schwitters
Department of Physics
Harvard University

Charles Townes
Department of Physics
University of California

Victoria Tschinkel
Private Consultant

Steven Weinberg
Department of Physics
University of Texas

Stanley Wojcicki
Department of Physics
Stanford University

MRC SSEC STAFF

Raphael Kasper
Project Director

William Spindel
Project Manager

Bratt Hammond
Associate Director
CBASSE

Larry McCray
Associate Director
CPSMR

Jerri Kushnir
Administrative Specialist

Sandy Nolte
Administrative Secretary

Enclosure 6

ORGANIZATION/CONTRACTORS SUPPORTING THE SSC SITE SELECTION EFFORT

U.S. DEPARTMENT OF ENERGY
Chicago Operations Office (CH)

CH has the responsibility for day to day administration of DOE contracts and work agreements related to SSC site selection. These contracts include RTK, ANL, BNL and SMS. Also, CH provides support to the Site Task Force (STF).

RAYMOND, TUDOR, KELLER & GANNON AND KNIGHT (RTK)

RTK is under contract with the DOE to provide technical support to the SSC site selection process including the development of Life Cycle Costs for each qualified proposal and the preparation of National Environmental Policy Act documentation.

LAWRENCE BERKELEY LABORATORY (LBL) AND BROOKHAVEN NATIONAL LABORATORY (BNL)

A small number of senior LBL and BNL personnel with unique expertise in the SSC design will assist in the evaluation process. They will provide assistance in developing Life Cycle Cost estimates, NEPA documentation and conducting geological reviews. They will be located primarily in the Oakland offices of RTK.

ARGONNE NATIONAL LABORATORY - (ANL)

ANL is under contract to the Chicago Operations Office to provide independent review of the SSC NEPA documentation being developed by RTK.

CALCULON

Calculon provides automated office systems development and support to the STF. Calculon is under contract to DOE Headquarters.

SYSTEMATIC MANAGEMENT SERVICES, INC. (SMS)

SMS provides clerical support to the SSC Site Task Force in Germantown and project control assistance to the Chicago Operations Office staff.

October 5, 1987

Review of Possible Use
of the Fermilab Tevatron as
an Injector for the SSC

- Use of Tevatron as an injector for the SSC has been proposed by the State of Illinois as part of their SSC site proposal.

- DOE has stated it has no objection to the proposed use of the Fermilab Tevatron provided the SSC can be positioned and can be constructed and operated in such a way as to minimize interference with the Tevatron research program and facilities needed for the program.

- A review of the possible use of the Tevatron is being conducted by RTK, a DOE contractor, supported by an expert panel.

  - Panel chaired by Robert Siemann, Wilson Synchrotron Laboratory (complete membership list attached).

- Scope of the RTK study includes the following instructions and consideration of the listed questions.

  It is required to examine the injector requirements for the SSC and the Fermilab Tevatron capabilities and potential upgrades essential for service of that device as an SSC injector.

  a. From a technical viewpoint, can the Fermilab Tevatron be utilized as the SSC injector?

  b. Assuming that use of the Tevatron as the SSC injector is technically feasible, what improvements or modifications to the Tevatron complex are required, and what would be the approximate costs of such improvements or modifications?

  c. Referencing Figure A-2, page 34, of the Invitation for Site Proposals for the Superconducting Super Collider (SSC), DOE-ER-0315, April 1987, and assuming that

the Tevatron modified or upgraded as appropriate is used as the injector for the SSC, examine the feasibility of placing the injector between the two innermost regions of the near straight section cluster and switching the upper interaction region with the upper utility region.

d. Presuming the change described in item c., how does it affect the placement, size, and/or shape of land areas J and I shown in Drawing SG-4, entitled "Land Areas," Appendix I and described in Appendix B, paragraphs B3.7 and B3.8, page 50, of the Invitation for Site Proposals document?

- The Panel has held two meetings to date; September 17-18, 1987, and September 28, 1987.

- Preliminary draft of the advisory report to the DOE is expected by October 15, 1987, and a final report is to be delivered by RTK to DOE by October 31, 1987.

HEPAP SUBPANEL ON TECHNICAL AND COST ISSUES OF THE FERMILAB TEVATRON AS INJECTOR TO THE SSC

Dr. Robert Siemann, Chairman
Wilson Synchrotron Laboratory
Cornell University
Ithaca, New York

Dr. Robert A. Jameson
Head AT Division
Los Alamos National Laboratory
Los Alamos, New Mexico

Dr. James McEwan Patterson
Stanford Linear Accelerator Center
Stanford, California

Dr. Jack Peterson
SSC/URA
Lawrence Berkeley Laboratory
Berkeley, California

Dr. Alessandro Ruggiero
Brookhaven National Laboratory
Upton, Long Island, New York

Dr. David F. Sutter (DOE Observer)
U.S. Department of Energy
Division of High Energy Physics
Washington, D.C.

During its deliberations on this legislation the Committee took the position that the Secretary shall estimate in each Life Cycle Cost analysis the construction and annual operating costs of the SSC, including, but not limited to, labor wage rates, climatic conditions, depth of the tunnel and method of construction, disposal of excavated spoils, cost of basic building materials, cost of electrical power, water and heating fuels, waste disposal, environmental mitigation, topology, geology and geohydrology, and surface obstacles.

The remaining provisions of this subsection are elements of the Committee's effort to "level the playing field" as regards consideration of DOE-owned existing improvements (including facilities) as compared the existing or proposed State improvements to a site.

The first such element of Subsection 102(d) directs there shall be no operating cost credits assigned under LCC estimates to any proposal on the basis of the expected use of existing Department of Energy-owned facilities.

Subsection 102(d) also precludes "double" counting for credits of existing DOE facilities which are considered as part of the construction component of Life Cycle Costs by prohibiting the counting of such credits again under the Technical Evaluation Criteria of the sites.

Finally, Subsection 102(d) prohibits DOE (or the National Academy of Sciences/National Academy of Engineering) from equating different proposals that are at variance with each other in terms of Life Cycle Cost estimates for purposes of selecting either the Best Qualified List or the final site. This provision is intended to negate paragraph 7 of enclosure 3 in the above referenced October 9, 1987 report which stated that DOE would consider LCC estimates of two or more sites to be equivalent if the LCC's of those sites varied by no more than 3%. Further, the DOE stated that a 3% variance factor was based on the range of uncertainty in the generic design estimates of LCC. For the total estimated LCC, i.e., $10.9 billion based on $4.4 billion construction and $6.5 billion in operating costs ($260 million per year for 25 years useful life) the 3% variance would be $327 million. The Committee expects that the margin of error in the LCC calculations should be stated separately by the DOE for each site and not handled generically.

The Department of Energy Administrative Provision in Title I, Chapter III, of the Fiscal Year 1987 Supplemental Appropriations Act, P.L. 100–71, required the careful attention of the Committee to the overall question of contributions and how they are to be assessed. A full explanation of this amendment offered by Senator Domenici can be found in the *Congressional Record,* pages H5660 and H5661, dated June 27, 1987 and pages S6876, dated May 20, 1987. The stated purpose of this amendment was to eliminate consideration of any State financial or other contributions to the SSC project in the site proposal evaluation which would be intended to help defray the cost of construction or operation of the SSC. However, this Domenici amendment, by omission of prescriptive language, allowed DOE to consider existing federally owned facilities at the proposed sites. The DOE's interpretation of the Domenici amendment prohibits consideration of only direct financial aid, tax incentives and utility rate subsidies. As a result, States which have no Federal facilities could not have their proposed cash or in-kind

contributions considered in the decisional process to overcome this perceived disadvantage. DOE also has said that a number of in-kind contributions will be considered, despite the Domenici amendment, under Technical Evaluation Criteria but not under Life Cycle Costs (LCC), e.g., new roads and road improvements, provision of electrical utility lines to site substations, and provision of natural gas supplies to a site distribution point. Presumably, these elements of DOE-owned site improvements would be similarly considered under the Technical Evaluation Criteria by the DOE. The Committee's changes represent its best effort to permit all the States to be fairly treated, by overcoming any imbalances introduced prior to H.R. 3228 as amended.

Section 103. International cost sharing

Section 103 sets up a process by which the Secretary of Energy shall determine the extent of international interest in sharing the cost of SSC construction and operation, and provide the results of that assessment to the Congress. The Department has announced its intent to seek international cooperation on the SSC, but in testimony during hearings held by the Subcommittee on International Scientific Cooperation on May 7, 1987, the DOE stated that it had neither developed criteria for accepting foreign contributions, nor initiated high-level government contacts with respect to SSC collaboration. The Department's view is that international negotiations are premature without a strong U.S. commitment to construction of the SSC.

The Committee shares the Department's concerns, and by adding the new requirements it seeks to illuminate a number of issues related to international participation prior to the Fiscal Year 1989 Congressional budget cycle. Therefore, Section 103(b) directs the Secretary, beginning February 15, 1988, to consult with the appropriate House and Senate Committees on the extent and implications (including impacts on national security and economic competitiveness) of the foreign assistance on the SSC that can most reasonably be expected. The bill mandates consultations rather than written reports in order not to prejudice ongoing international discussions.

These consultations should provide the Congress with valuable and timely information, not only on the extent and nature of the interest in international cost-sharing on the SSC, but also on potential problems with respect to national security and the economic competitiveness of domestic industries which may affect the evaluation of international offers to participate. The Subcommittee on International Scientific Cooperation has held several hearings in 1987 during which the lack of cooperation among Federal agencies in international science was discussed. It is the Committee's intent in adopting Section 103(b)2(G) to assure meaningful coordination by participating agencies. While the Committee agrees with the Department's view that the full extent of international cost-sharing may not be known by the beginning of the Fiscal Year 1989 budget cycle, it also believes that methods for evaluating international offers to participate must be in place as soon as possible.

Section 104. Conflict of interest

The SSC will be one of the largest Federal scientific projects ever undertaken. Therefore, the Committee felt it necessary to include language regarding conflicts of interest which can assure that the best persons are chosen to participate in the construction and operation of the SSC.

In developing this legislation the Committee had asked questions of the DOE concerning the prior contractual arrangements for the Central Design Group to provide technical support.

The following correspondence from the DOE responded to these concerns.

Department of Energy
Washington, DC 20585

September 25, 1987

Mr. Robert C. Ketcham
General Counsel
Committee on Science, Space
and Technology
Room 2321 RHOB
Washington, DC 20511

Dear Mr. Ketcham:

I wanted to advise you of the arrangements we are making for acquiring technical support to the Department of Energy (DOE) Superconducting Super Collider (SSC) site selection activity. The areas of required technical support include development of Life Cycle Costs (LCC) for each proposal, preparation of National Environmental Policy Act (NEPA) documentation, and oversight of the RTK Joint Venture (RTK) geological review activities. RTK is a DOE prime contractor assisting in the site selection process. The DOE is very mindful of the sensitivity of the site selection process and the importance of taking every precaution to avoid even the appearance of a conflict of interest in the evaluation and selection process.

We intend to use a small number of senior Lawrence Berkeley Laboratory (LBL) and Brookhaven National Laboratory personnel who have been attached to Central Design Group (CDG) but will not interact with CDG or its parent organization, Universities Research Associates, except as described later in this letter. These personnel have a unique expertise regarding the SSC design necessary to assist in the evaluation process. Generally, these personnel have been supporting the CDG effort since the development of the Reference Designs Study and Conceptual Design Report. Neither the Laboratories nor those personnel have any interest in the selection of any particular site and are not assisting any proposer.

These personnel will be detailed by their respective laboratories to the DOE to perform these supporting activities. We expect these assignments to extend through the completion of the SSC site selection process (January 1989). These personnel will be located primarily at the Oakland offices of RTK. The LCC, NEPA documentation, and geological review assistance will be conducted by RTK in their offices. The site proposals will be protected within designated RTK offices and secured when not in use to prevent any unauthorized disclosure of information.

While resources other than the CDG will be considered first, some technical questions may arise during the evaluation process which will require analysis and data that can only be provided by the CDG. The CDG will be utilized only when their background and expertise are required to address particularly unique and difficult specific technical questions. The CDG has no interest in the choice of any specific site and is not assisting any proposer. Additionally, such questions will be presented to the CDG in a manner to preclude any association with a particular proposal. We believe this process will assure the anonymity of the proposer, limit any CDG involvement to an absolute minimum, and provide the essential data we need to evaluate the proposals.

All DOE and contractor personnel who have any involvement in the site selection process are required to sign appropriate Conflicts of Interest forms and Confidentiality Certificates.

I hope this is a clear outline of our intended arrangements and demonstrates our commitment to a fair and unbiased proposal evaluation process. Please call if you have any questions.

Sincerely,

James F. Decker
Acting Director
Office of Energy Research

Section 104(a) directs the Secretrary of Energy not to enter into an agreement to manage the operation of the SSC facility with a person who has provided advice to the Department on the SSC project unless the Secretary complies with subsection (b). Subsection (a) is intended to preclude the possibility of any person who is in an advisory position to the Secretary on the SSC project from giving advice which might enhance their chance to manage or in any way control or support the operation of the SSC.

Section 104(b) permits the Secretary to enter into an agreement prohibited by Section 104(a) if he makes a finding and notifies the Congress, and the public through the *Federal Register*, that such agreement is necessary, is in the best interest of the Nation, and he cannot reasonably find other persons who have not provided such advice, program direction, oversight, technical analyses, or other technical or management assistance to the DOE on the project. This section was added by the Committee as an addition to the existing law with respect to applications of conflict-of-interest to Federal agency programs and activities.

Section 105. Authorization of appropriations

Section 105(1) authorizes $25 million for operating expenses, including research and development and site evaluation in Fiscal Year 1988, $86 million for operating expenses including research and development and for capital equipment in Fiscal Year 1989, and $90 million for operating expenses including research and development and for capital equipment for Fiscal Year 1990. In setting out the two separate program elements for operating expenses, "research and development", and "capital equipment", the Committee expects that DOE will continue its practice of separately requesting these amounts. The authorized funds in this section and the next section are amounts identified in the President's amended budget request for the DOE High Energy Physics program submitted to the Congress, February 5, 1987.

Section 105(2) defines the SSC Project as a line item project number 88-R-103 for DOE budget submission purposes and authorizes $10 million for architectural/engineering and long-lead procurement in Fiscal Year 1988; $283 million for construction in Fiscal Year 1989; and $585 million for construction in Fiscal Year 1990.

Section 106. Future authorization requests

Section 106 requires the President to request a two-year authorization and appropriation for the development, construction, and operation of the SSC project beginning with the Fiscal Year 1989 budget submission.

Section 107. Proposal for funding

Section 107 requires the future Administrations to live up to this Administration's commitment to fund the SSC in a manner that does not diminish other science and space research activities in the government. This section requires the President to treat the SSC funding requirements as an add-on to the civilian science budgets of the Department of Energy, the National Aeronautics and Space Administration (NASA), and the National Science Foundation

(NSF). A number of Administration officials, including the Secretary of Energy, have repeatedly expressed the Administration's intent consistent with this provision. The following letter from the Associate Director, Natural Resources, Energy and Science of the Office of Management and Budget, in the Executive Office of the President, is illustrative of this commitment. This provision codifies the commitment.

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

14 OCT 1987

RECEIVED
OCT 15 1987
Committee on Science, Space, and Technology

Honorable Robert A. Roe
Chairman
Committee on Science,
Space and Technology
House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

This letter is to re-affirm the Administration's commitment to provide the necessary funds for construction of the Superconducting Super Collider (SSC) Project.

As you know, the President approved the SSC project after the FY 1988 budget was submitted to Congress. In the Mid-Session Review of the FY 1988 Budget transmitted to Congress in August, the Administration adjusted its budget estimates to include the cost of the project. In particular, the Mid-Session report included total project estimates (construction and supporting research and development) for FY 1989 of $363 million in budget authority and $269 in outlays, and FY 1990 estimates of $675 million in budget authority and $594 in outlays. I am enclosing a copy of the Mid-Session report, with the references to the SSC project highlighted.

The funding for the SSC Project is proposed as an overall increase to the budget for general science, space, and technology programs (Function 250). It is the Administration's intent that funds for the SSC not be at the expense of support for other Federal basic research programs, including those in the Department of Energy, the National Science Foundation and the National Aeronautics and Space Administration.

I hope that the Committee finds this information helpful in its mark-up of the SSC authorization bill. The Administration looks forward to continued support and cooperation from Congress on this important project.

Sincerely,

Robert K. Dawson
Associate Director
Natural Resources,
Energy and Science

Enclosure

Section 108. Budget justification report

Section 108 requires the Director of the Office of Science and Technology Policy (OSTP) within the Executive Office of the President to prepare and submit to the Congress a financial plan. The financial plan must identify the expected funding expenditures for the current year, i.e. the Fiscal Year beginning the prior October 1, and the projected requirements for the two succeeding Fiscal Years for the completion of development and construction of all other new civilian science facilities, and the operating and capital equipment expenses for all civilian science programs in the Federal Government. The Committee recognizes that the OSTP will prepare the plan in consultation with the Office of Management and Budget within the Executive Office.

The root of the Committee's concern, in Section 107 is potential imbalances between programs of NASA, NSF, and DOE General Sciences (including High Energy and Nuclear Physics), all contained in Budget Function 250. The Committee has acted this year on a strong NASA budget for Fiscal Year 1988 which includes full first-year funding for the Space Station. The Committee also endorsed the total NSF budget request, after shifting some of its priorities, which anticipates a doubling of the NSF budget in five years.

By its actions in this bill the Committee has added another major element to the Budget Function 250 which supports General Science. The Committee feels that preparation of the financial plan required under this section will aid in assuring the balanced growth in these civilian science programs projected by the Administration and the Committee.

Section 108 will further assure that the President gives appropriate consideration to a continuing commitment that the funding for the SSC project will be an incremental addition to the budgets for the government's science programs and will not erode the funding expected to be available for these program activities. A financial plan is required so that the Congress can see for itself that the SSC project will not have an unfavorable impact on the other science programs in the government. The financial plan will also contain a comparison and analysis of differences between the current financial plan and the financial plan submitted with the budget of the preceding year.

Section 109. Department of Energy report

The Department of Energy is utilizing the expertise of the National Academy of Sciences/National Academy of Engineering to evaluate the site proposals made to it. The Academies are to conduct an independent evaluation of the qualified proposals, and then provide DOE with a report on their evaluation, including an unranked list of the Best Qualified Sites.

Section 109 requires the Secretary to submit the National Academy of Sciences/National Academy of Engineering (NAS/NAE) report containing the Best Qualified List (BQL) of sites to the appropriate committees of Congress within 30 days of receipt of the report. The Committee recognizes that the BQL will not be ranked by the NAS/NAE but expects that the NAS/NAE analyses of the

Technical Evaluation Criteria, as well as DOE's LCC values, will be provided for each site on both of the lists (BQL and non-BQL sites).

Section 110. Congressional Budget Office Review

Section 110(a) requires the Congressional Budget Office to review the DOE Central Design Group's completed generic cost estimates for the SSC project published in March 1986, in a document entitled "The Conceptual Design of the Superconducting Super Collider" (SSC-SR-2020), and report to the appropriate committees of Congress. The review is required to be completed and the report submitted within 60 days after enactment of this Act.

Section 110(b) requires the Congressional Budget Office to complete a review, and submit a report to the appropriate committees of Congress, on the adequacy and accuracy of the DOE's cost estimate for the SSC at the selected site within 60 days after such cost estimate is completed by the DOE.

V. SECTION-BY-SECTION ANALYSIS OF H.R. 3228, AS AMENDED

Section 101 titles the act the "Superconducting Super Collider Project Authorization Act of 1987".

Section 102 authorizes the Secretary of Energy to enter into cooperative arrangements with a State or other persons in accordance with the Department of Energy's published "Invitation for Site Proposals for the Superconducting Super Collider (SSC)" (DOE/ER-0315) dated April 1987.

Section 102(b) requires the Secretary to undertake the development of advanced technologies that could reduce the cost or enhance the performance of the SSC. The Secretary is required to annually review advances in basic and applied research, including superconductivity, that may be utilized in the SSC, and to report his findings to the Congress in January of each year.

Section 102(c) directs the Secretary to choose a project manager for the SSC project within 6 months of passage of the Act. The Secretary is directed to seek to have the SSC constructed and operated using open competition procedures.

Section 102(d) directs the Secretary in the ranking of the SSC site proposals to give a relative weight of 25% to Life Cycle Costs and 75% to Technical Evaluation Criteria. No operating cost credits may be given to any proposal under Life Cycle Costs for the use of DOE-owned site improvements. No infrastructure credits may be taken in the Technical Evaluation Criteria for facilities already given construction credits in determining Life Cycle Costs. In comparing Life Cycle Costs, no variance factor may be used to equate comparable proposals.

Section 103(a) sets forth findings on the importance of international cost-sharing and the need for an adequate assessment of foreign interest and commitment to support funding of the SSC.

Section 103(b)(1) requires the Secretary to ascertain the interest of foreign nationals and sovereigns in providing funding or other assistance in the SSC project. The Secretary is directed to consult with domestic industries and other Federal agencies to obtain information necessary to carry out subsection (a).

Section 103(b)(2) requires the Secretary to consult with the appropriate committees of Congress on the most likely foreign assistance, and the potential usefulness, potential budget impact, national security problems, the affect on domestic industrial competitiveness, the extent of consultations, and the necessary interagency cooperation, relative to such potential assistance.

Section 104(a) prohibits the Secretary from signing an agreement to control or support the operation of the SSC facility with any person who has provided advice to the Department of Energy on the SSC project unless the Secretary complies with subsection (b).

Section 104(b) permits the Secretary to enter into an agreement prohibited under subsection 104(a) if he makes a finding and notifies the appropriate committees of Congress, and the public through a *Federal Register* notice, 60 days before signing such an agreement. The finding must be that the execution of the contract is necessary, in the best interest of the Nation, and cannot be reasonably be consummated with other persons who have not provided such advice to the Department of Energy.

Section 105(1) authorizes $25 million for operating expenses including research and development and site evaluation in Fiscal Year 1988, $86 million for operating expenses including research and development and capital equipment in Fiscal Year 1989, and $90 million for operating expenses including research and development and capital equipment for Fiscal Year 1990.

Section 105(2) defines the SSC project as project number 88-R-103 and authorizes $10 million for architectural/engineering and long-lead procurement in Fiscal Year 1988; $283 million for construction in Fiscal Year 1989; and $585 million for construction in Fiscal Year 1990.

Section 106 requires the President beginning in Fiscal Year 1989, to request a two-year authorization and appropriation for the development, construction, and operation of the SSC project.

Section 107 requires the President to propose funding for the SSC in a manner that supports and does not diminish other science and space research activities in the government. The President is required to treat the SSC funding in his annual budget request to Congress as an addition to the civilian science budgets of the Department of Energy, the National Aeronautics and Space Administration, and the National Science Foundation.

Section 108 requires the Director of the Office of Science and Technology Policy within the Executive Office of the President to prepare and submit a financial plan to the Congress with the President's annual budget request. The financial plan must identify the funding requirements for the current year and two succeeding Fiscal Years for the completion of development and construction of all civilian science facilities, and for the operating and capital equipment expenses for all civilian science programs in the Federal government. The financial plan must also contain a comparison and analysis of differences between current financial plan and the financial plan submitted for the budget of the preceding year.

Section 109 requires the Secretary to submit the National Academy of Sciences/National Academy of Engineering report containing the Best Qualified List of sites to the appropriate committees of Congress within 30 days of receipt.

Section 110(a) requires the Congressional Budget Office to review the DOE Central Design Group's cost estimate for the SSC project and report to the appropriate committees of Congress. The review is required to be completed and the report submitted within 60 days after enactment of this Act.

Section 110(b) requires the Congressional Budget Office to complete a review, and submit a report to the appropriate committees of Congress, on the adequacy and accuracy of the DOE's cost estimate for the SSC at the selected site within 60 days after such cost estimate is completed by the DOE.

VI. COST ESTIMATE

In accordance with the requirements of section 252(b) of the Legislative Reorganization Act of 1970, and pursuant to Rule XIII, Clause 7, of the Rules of the House of Representatives, the Committee estimates the costs to be incurred by the Federal government during the current and five subsequent years as result of the enactment of this legislation as follows:

Fiscal year		Budget outlays
1988	$350,000,000	$340,000,000
1989	369,000,000	230,000,000
1990	675,000,000	440,000,000
1991	774,000,000	666,000,000
1992	809,000,000	784,000,000
1993	879,000,000	842,000,000

VII. INFLATION IMPACT OF BILLS AND JOINT RESOLUTIONS OF PUBLIC CHARACTER

In accordance with rule XI, clause 2(l)(4), of the Rules of the House of Representatives, this legislation is assessed to have minimal inflationary effect on prices and costs in the operation of the national economy.

VIII. COMMITTEE OVERSIGHT FINDINGS AND RECOMMENDATIONS

Pursuant to Rule XI, Clause 2(l)(3), of the Rules of the House of Representatives and under the authority of Rule X, Clause 2(b)(1) and Clause 3(f), the results and findings from the Committee's oversight activities are incorporated in the recommendations found in the present bill and report.

IX. SUMMARY OF GOVERNMENT OPERATIONS COMMITTEE—FINDINGS AND RECOMMENDATIONS

No findings and recommendations on oversight activity pursuant to Rule X, Clause 2(b)(2), and Rule XI, Clause 2(l)(3), of the Rules of the House of Representatives have been submitted by the Committee on Government Operations for inclusion in this report.

X. BUDGET ANALYSIS AND PROJECTION

The bill provides for new authorization rather than new budget authority and consequently the provisions of section 308(a) of the

Congressional Budget Act are not applicable. Under a separate section of this report, a five-year current programs estimate is provided in response to the requirement of section 403 of the Congressional Budget Act of 1974.

XI. CONGRESSIONAL BUDGET OFFICE COST ESTIMATE AND COMPARISON

U.S. CONGRESS,
CONGRESSIONAL BUDGET OFFICE,
Washington, DC, October 20, 1987.

Hon. ROBERT A. ROE,
Chairman, Committee on Science, Space, and Technology,
U.S. House of Representatives, Washington, DC.

DEAR MR. CHAIRMAN: The Congressional Budget Office has prepared the attached cost estimate for H.R. 3228, a bill to authorize appropriations to the Secretary of Energy for the Superconducting Super Collider Program.

If you wish further details on this estimate, we will be pleased to provide them.

With best wishes,
Sincerely,

EDWARD M. GRAMLICH,
Acting Director.

CONGRESSIONAL BUDGET OFFICE, COST ESTIMATE

1. Bill number: H.R. 3228.

2. Bill title: A bill to authorize appropriations to the Secretary of Energy for the Superconducting Super Collider Program.

3. Bill status: As ordered reported by the House Committee on Science, Space, and Technology, October 15, 1987.

4. Bill purpose: H.R. 3228 would authorize appropriations of nearly $1.1 billion for the operating expenses and construction costs of the Superconducting Super Collider (SSC). This total includes $35 million for fiscal year 1988, $369 million for fiscal year 1989, and $675 million for fiscal year 1990. H.R. 3228 would require that future Department of Energy budgets include a two-year authorization and appropriations request for SSC. This bill would also require several reports on the estimated costs of the SSC, including a Congressional Budget Office (CBO) review of the cost estimate prepared by DOE in 1986.

5. Estimated cost to the Federal Government:

[By fiscal year, in millions of dollars]

	1988	1989	1990	1991	1992
Operating expenses					
Authorization level	25	86	90	.....	.....
Estimated outlays	19	71	89	22	.....
Construction					
Authorization level	10	283	585	.....	.....
Estimated outlays	3	89	292	319	175
Total					
Authorization level	35	369	675	.....	.....
Estimated outlays	22	160	381	341	175

The cost of this bill fall within budget function 250.

Basis of estimate: This estimate assumes that the full amounts authorized would be appropriated for each fiscal year. The estimated outlays are based on historical spending patterns for similar activities. CBO expects that the budget reports required by the bill could be completed with existing resources, and would not result in any significant additional costs to the federal government.

6. Estimated cost to State and local governments: None.

7. Estimate comparison: None.

8. Previous CBO estimate: None.

9. Estimate prepared by: Michael Sieverts.

10. Estimate approved by: C.G. Nuckols (for James L. Blum, Assistant Director for Budget Analysis).

XII. CHANGES IN EXISTING LAW

In compliance with Rule XIII, Clause 3, of the Rules of the House of Representatives, this bill, if enacted would make no change in existing law.

XIII. RECITAL OF RECORD VOTE ON REPORTING—COMMITTEE RECOMMENDATION

The Committee on Science, Space and Technology, by a recorded vote of 38 to 6, a quorum being present, ordered H.R. 3228, as amended, favorably reported to the House of Representatives on October 15, 1987.

ADDITIONAL VIEWS OF MARILYN LLOYD ON THE NEED TO PROTECT BASIC SCIENCE PROGRAMS

The Superconducting Super Collider (SSC) promises to be an exciting physics project and should be strong evidence for this country's commitment to world scientific pre-eminence. However, as Chairman of the primary subcommittee of jurisdiction, I did not choose to be a co-sponsor of SSC legislation until the well-crafted substitute to H.R. 3228 came before the Committee. I am particularly pleased with Section 107 and Section 108 of the substitute which are aimed at holding the executive to the critical commitment that new money will be available for the SSC so as not to impact the growth in other science programs. There was much concern evidenced in the Committee about the great pressures on Budget Function 250 which contains all NASA programs except aeronautics, the National Science Foundation budget and the DOE science programs in High Energy and Nuclear Physics. Before the FY89 budget was submitted to the Congress, I expressed my deep concern about the major need to protect other basic science projects in the DOE Office of Energy Research which are already under construction or expected to be line items within the next two fiscal years. These projects included the Relativistic Heavy Ion Collider (RHIC), and the Continuous Electron Beam Accelerator Facility (CEBAF) in Nuclear Physics (also in Budget Function 250) and the Compact Ignition Tokamak (CIT), the lead project in magnetic fusion, the Advanced Photon Source (APS) which promises to be a major interdisciplinary science facility in the midwest and the Advanced Neutron Source (ANS) which is to be our major Nuclear Science tool for the mid-1990s and beyond. These are all exciting projects which will challenge our best scientists and technologists in both their construction, operation and utilization.

I was also aware of the expected requirements for upgrades of the national Synchrotron Light Source, a demonstrated major science user facility at the Brookhaven National Laboratory, and upgrades of machines such as BEVALAC at Lawrence Berkeley Laboratory and the Bates Accelerator at Massachusetts Institute of Technology. These projects which are key to the future of U.S. pre-eminence in these areas, should also be protected as the SSC funding goes forward. In that manner, the SSC project can serve as a symbol to heighten the national consciousness for the need to increase science and space research across the board. This nation's technological leadership and U.S. global technological competitiveness will ultimately depend on how broad and deep a commitment both the Executive and the Congress can sustain for these science and space research programs.

MARILYN LLOYD.

SSC DISSENTING VIEWS

The debate over the SSC reflects the wider debate over federal R&D investment priorities. Even basic research investments can and need to be prioritized. There seems to be a feeling that simply by investing in basic research, any basic research, that technological advance, economic growth, and global competitiveness will ensue. That is not the case, Different basic research investments serve different purposes.

Further, proponents have said that the SSC will produce technological spinoffs helping to make America more competitive. But that is very far from the function of an SSC whose purpose is to delve deeply into the fundamental nature of matter. Building the SSC to obtain these spinoffs is a backward and expensive way to boost U.S. competitiveness. If the additional billions were available, and that's not likely given the overriding need to reduce the deficit, America's economic and technological competitiveness would be much better served by investing in areas such as superconductivity, semiconductors, photonics, advanced materials, biotechnology, manufacturing sciences, etc. In these areas we're in a race which could define not only who leads the world in the 21st century but the standard of living of the American people. Basic research investments must be subject to a priority setting process.

The committe, by authorizing the SSC, is committing a significant portion of the science budget to a project which is likely to "squeeze-out" billions of dollars from other important programs over the next decade and beyond, especially when operating expenses of hundreds of millions of dollars per year are considered. Necessary budget savings will invariably come from other areas of science when the Appropriations Committee acts Gramm-Rudman budget pressures.

Congress has already committed to several very large R&D programs, including the Space Station with a price tag estimated at, at least $16 billion and an operating budget estimated at $1 billion per year. Other program commitments include doubling the National Science Foundation budget over the next five years and getting the Shuttle back into service over the same period.

Major proposals include mapping the human genome system and designing and operating the aerospace plane. The committee needs to establish priorities that are in keeping with the realities of global competitiveness and our own budget process.

The cost of doing research in big science has grown 10-fold in the past 15 years. The scale on which big science must operate has grown so vast that the only prudent course for proceeding with a major new project is with agreements for international cost-sharing. For years, foreign nations have waited while the United States invests billions in basic research and then used the results to develop new technologies and products. If other nations are to share in

the benefits of basic research then it only makes sense that they share in the costs.

And, while the committee moves to fund a new particle accelerator, at a cost of $4–8 billion and an annual operating budget of at least $300 million, DoE's other high energy facilities are not operating at full capacity due to insufficient funds. Fermilab's Tevatron is not operating at full capacity, and the center was forced to make the center's first ever layoffs. The Stanford Linear Accelerator Center (SLAC) will be able to run only for 3 months or less this year because Congress cut its FY 1987 budget. With the indicators of fiscal reality all around us it seems strange that the SSC is being considered outside of those indicators.

The United States is in a technological race for its life. We must marshal our resources to improve our ability to compete in the short term whole simultaneously laying the groundwork for our future preeminence. Going forward with the SSC at this time simply doesn't fit with America's needs.

CLAUDINE SCHNEIDER.
ROBERT S. WALKER.
DON RITTER.
ROBERT C. SMITH.
JACK BUECHNER.

DISSENTING VIEWS OF CONGRESSMAN BUDDY MacKAY

Let me first associate myself with the dissenting views also included here by Mr. Ritter and others regarding the SSC. I share their concerns.

In addition to serving on the Science Committee, I am a member of the House Budget Committee. Being on the Budget Committee has given me a keen sense of the importance of setting priorities. It is in that spirit that I must oppose this bill.

As a member of the Science Committee, I believe the SSC does offer the prospects for some exciting science. However, I believe very strongly that this committee cannot blindly proceed with authorizing funding for every exciting science project without regard for the very strong pressure to cut or restrain Federal spending in the area of the Gramm-Rudman Deficit Reduction Act.

By simply advocating every exciting science project without regard to spending limits, this Committee leaves the chore of setting priorities to the Budget and Appropriations Committees and to the House as a whole. I believe that to do that is to abrogate our primary responsibility as the Science Committee, which is to set priorities in Science.

Already this year, the Science, Space and Science Committee has advocated several major new and very expensive programs, including:

NASA's Space Station ($16–30 billion in design and construction; $1 billion annually thereafter in operations costs)

Mapping the Human Genome ($300 million–$3 billion)

Doubling the NSF Budget (adding $1 billion per year for 10 years)

A Congressionally-proposed University Research Facility Revitalization Act ($2.5 billion)

Replacing the lost Space Shuttle Challenger ($2.5 billion)

Each of these projects offers exciting science. Yet the harsh reality is that the entirety of spending for civilian science is now $10.7 billion. In the event of Gramm-Rudman sequestration, clearly possible if not probable, that level would be cut to $9.8 billion. Such a sequestration would require a *cut* of $62 million for DOE General Science, instead of an addition of $35 million as a downpayment on the SSC. Further, it would require a cut of $126 million from NSF, not the doubling of funding we had hoped for; and it would require cutting NASA by $721 million, an amount virtually identical to the amount we had planned to spend on the Space Station this year.

Of additional concern to me is the fact that the very large projects, such as the SSC and the Space Station, have the political base of support to hold off cuts, thereby exposing other, less politically powerful projects to still greater cuts.

Between now and 1993, Gramm-Rudman requires us to reduce the deficit to zero. Yet, in the very same time period, this commit-

tee seeks to build the SSC and the Space Station. At their funding peaks, SSC will outlay at about $1 billion. The Space Station could hit outlays of $4 billion in the same year. That means that those two programs alone will be consuming more than 50% of the entire amount we are currently spending for civilian science—including all of NASA, NSF and DOE General Science.

This committee cannot unilaterally repeal Gramm-Rudman. To simply pretend it doesn't exist is not only foolish, but will end up crippling the very programs we all support.

Our requests for funding from the Budget and Appropriations Committees will not be credible if we blindly authorize unlimited funding for every exciting new project.

We owe it to our colleagues to do our job and set those priorities for constrained funding.

Just as importantly, we owe it to America's science community, whose spokesmen we must be in Congress.

Therefore, I must oppose the authorization of construction funds for the SSC until the Administration has proposed a comprehensive plan for funding it without contributing to the budget deficit and without starving all other science. Further, I strongly believe we should be seeking international cooperation in funding this project.

BUDDY MACKAY.

ADDITIONAL VIEWS OF HON. SHERWOOD BOEHLERT

I believe we are missing a major opportunity with this bill—a chance to improve the science while reducing the costs associated with the Superconducting Super Collider (SSC). This bill should require the Department of Energy (DOE) to review transborder sites.

The Department has rules that sites that cross international borders are not eligible for funding. Unfortunately, the Department has never been able to come up with a rationale for its decision.

Sometimes, DOE witnesses before our Committee claimed that international sites were being prohibited because such sites gave an "unfair advantage" to certain states. This was unpersuasive given that no other advantages states could offer were deemed "unfair."

Then DOE told us a transborder site was ineligible because the project must improve "American scientific and technological leadership." It's hard to see how that leadership is eroded as the project passes under the Canadian border, especially when the campus would be entirely within the United States.

We have a nation at our northern border that presents no security concerns, which has a history of successful agreements with the United States, which has suggested a willingness to contribute up to 10 percent of the costs, which has access to cheap hydropower, which has top-notch scientists, which has expressed interest in forming an international consortium; we have, in short, an absolutely ideal opportunity for international cooperation, yet DOE just can't take "yes" for an answer.

When this bill comes to the floor, I may offer an amendment requiring DOE to give international sites the full consideration they deserve. I think our pleas for international cooperation are going to sound awfully hollow if we turn down this opportunity to reduce the cost of this hugely expensive project.

There's no reason to beware of Canadians bearing gifts.

SHERWOOD BOEHLERT.

○